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IN THE SPECIFICATION:

[5] These types of systems typically have an exhaust gas duct, within which the heat exchanger is arranged, and a bypass duct. By controlling the proportion of the overall exhaust gas flowing through the heat exchanger duct, the system can create a desired heating characteristic of the system. To this end, the exhaust pipe valve can be controlled according to external parameters.

[7] In the environment shown in Figure 1, the proportion of gas flow through the ducts is controlled by varying the flow resistance of the bypass duct 9. When the exhaust pipe valve 10 is in its completely opened position, the flow resistance of the bypass duct 9 is significantly less than the flow resistance of the heat exchanger 7 in the heat exchanger duct 5. This results in almost no gas flow through the heat exchanger 7. Conversely, when the exhaust pipe valve 10 is in its completely closed position, the gas flow through the bypass duct 9 is blocked, and the gas flows completely through the heat exchanger 7, apart from a small leakage flow past the exhaust pipe valve 10. Controlling the position of the exhaust pipe valve 10 in intermediate positions makes it possible to obtain any desired proportion of gas flow through both ducts.

[8] In the system environment shown in Figure 2, the gas flow is controlled directly by operating the exhaust pipe valve 10 so that the inlet opening of the heat exchanger duct 5 or the bypass duct 9 is opened or closed. Here again, intermediate positions of the exhaust pipe valve 10 makes it possible to obtain any desired proportion of the gas flow through the ducts.

[11] The invention is generally directed to an exhaust pipe valve having a housing, a bearing sleeve mounted in the housing, a valve spindle rotatably mounted in the bearing sleeve, and a valve plate mounted at the valve spindle. The bearing sleeve has a primary bearing surface on ~~the~~ a side facing the valve plate. The valve spindle has a primary sealing surface that cooperates with the primary bearing surface of the bearing sleeve. A

washer is arranged on the valve spindle to cooperate with the bearing sleeve on the side facing away from the valve plate, and a spring biases the primary sealing surface of the valve spindle against the primary bearing surface of the bearing sleeve while biasing the washer against the bearing sleeve.

[12] In one embodiment, a secondary bearing surface is formed on ~~the~~ a side of the bearing sleeve facing away from the valve plate, and a secondary sealing surface is formed on the washer to cooperate with the secondary bearing surface. Providing the sealing surfaces and the bearing surfaces on both sides of the bearing sleeve improves the sealing effect and the stability of the bearing. The sealing surface may be formed on a radially projecting shoulder formed integrally with the valve spindle.

[29] In order to improve the sealing qualities between the valve spindle and the bearing sleeve, the valve spindle may at least be partially provided with a ceramic coating. The coating is disposed on at least on the primary sealing surface of the valve spindle. The ceramic coating ensures that the valve spindle can be rotated relative to the bearing sleeve over a long lifetime and under high operating temperatures which may be in the region of up to 800°C. At the same time, the ceramic coating has a low surface roughness, resulting in good sealing properties. The ceramic coating may contain titanium (Ti), aluminum (Al) and/or chromium (Cr). Additionally, yttrium (Y) and nitrogen (N) may be present in the ceramic coating. Still further, a second ceramic coating containing Ti, Al and/or N may be provided over the ~~first~~ initial ceramic coating.

[33] The valve plate 14 is attached to a valve spindle 16 formed from heat-resistant steel, such as steel with Werkstoff No. 1.4122 or 1.4104. For the valve plate, steel with Werkstoff No. 1.4301 is particularly suitable. The valve spindle 16 comprises a radial shoulder 18 formed integrally with the valve spindle 16. The radial shoulder 18 has a ~~conical~~ sealing surface 20, which may have a conical profile, on the side facing away from valve plate 14.

[34] The valve spindle 16 is rotatably mounted within a bearing sleeve 22 formed from steel with Werkstoff No. 1.4122 or 1.4104. On ~~its~~a side facing the radial shoulder 18, the bearing sleeve 22 has a ~~conical~~ bearing surface 24, which may have a conical profile. The inclination of the bearing surface 24 corresponds to the inclination of the sealing surface 20. In one embodiment, the bearing surface 24 and the sealing surface 20 form an angle of approximately 20° with a radially extending plane.

[35] A coating may be deposited on the shoulder ~~16~~18, particularly in the region of sealing surface 20. This coating may be made from a ceramic material comprising at least one of Ti, Al, Cr, Y and N. Over this first coating, a second coating is provided containing Ti, Al and N. These coatings provide a smooth, durable surface so that the cooperation of the sealing surface 20 with the bearing surface 24 forms a primary seal that almost entirely prevents any leakage of exhaust gas through the valve.

[36] On the side facing away from the valve plate 14, the bearing sleeve 22 is provided with a secondary bearing surface, which may have a conical profile like the bearing surface 24. The secondary bearing surface 26 cooperates with a secondary~~, conical~~ sealing surface 28 formed on a washer 30. The secondary sealing surface 28 also has a conical profile. The washer 30 may be formed from a thermally resistant material, such as steel with Werkstoff No. 1.4122 or 1.4104. The coating described above with respect to the sealing surface 20 can also be deposited on the sealing surface 28 of the washer 30.

[37] A spring washer 32 made from an alloy, such as INCONEL, is arranged on ~~the~~ a side of washer 30 facing away from the valve plate 14. ~~A~~ The spring washer 32 is compressed by a nut 34 threaded on a thread 36 on the valve spindle 16, with an operating lever 38 being arranged between the nut 34 and the spring washer 32. The operating lever 38 may be actuated by a stepper motor or any comparable actuation unit, allowing the operating lever 38 to position valve plate 14 in any desired orientation.

[38] Figures 4 and 5 show another embodiment of the inventive valve. The valve structure shown in Figures 4 and 5 is similar to the valve structure shown in Figure 3 with respect to the bearing of the valve spindle ~~14~~16. The main difference in this embodiment is that valve plate 14 is not essentially circular and mounted centrically to valve spindle

~~14~~16; instead, the valve plate extends eccentrically from the valve spindle ~~14~~16 in this embodiment. Both valve structures support the valve plate on only one of its sides. This is possible ~~since~~ because bearing sleeve 22 has a certain amount of extension in the axial direction, leading to a comparatively large distance between the primary and the secondary bearing surfaces. This distance provides enough stability to counteract any tilting loads introduced by the valve plate 14 without requiring any additional bearing structure on the opposite side of the valve plate 14.

[41] In a third step shown in Figure 8, the washer 30 is mounted on the valve spindle 16 such that the secondary sealing surface 28 of the washer 30 cooperates with the secondary bearing surface 26 of the bearing sleeve 22, thereby forming a secondary seal. The washer 30 is dimensioned such that there is a very close running clearance R between the inner opening of the washer 30 and the valve spindle 16. The close clearance R ensures that the valve spindle 16 is correctly centered within the washer 30, thereby ensuring precise positioning of the valve plate 14.